THE FOOD HABITS OF SOME APHROPHORA LARVAE.

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The larvae of all the American species of the Family Cercopidae as far as known envelope themselves in a frothy mass. Contrary to popular opinion and to most of the published accounts this froth does not issue as bubbles from the body of the insect, but is made by pushing the tip of the abdomen up out of the froth and grasping, with the anal appendages, a bubble of air and bringing it down and releasing it within a liquid film. This liquid film is simply the excretion from the alimentary canal of the sap which is imbibed by these insects in large quantities. This copious liquid excretion is a common occurrence in other families of the Homoptera. In the Plant Lice (Aphidae) it gathers in drops and is called "Honey Dew." The Leaf Hoppers and Tree Hoppers expel a clear liquid with some force. In some species this is in sufficient amount so that when the insects are numerous the foliage may drip, producing the "Weeping trees" of the Southern States.

This process of froth making in the Cercopidae was discovered and first correctly described by Professor E. S. Morse, of Salem, Mass., and published many years ago in his Elementary Zoology. * His observations were probably made on the larvae of *A. spumarius* which belongs to the genus *Philaenus* as now recognized.

In the genus *Aphrophora* as now limited little is known of the food habits of the larvae. One species (*A. 4-notata*) has been found on various plants and shrubs. The remaining three eastern species, which belong to a different group and are of some shade of brownish testaceous, have been given as feeding on pines in the adult state by various authors. Dr. Fitch has described the larvae of one of these (*A. parallela*, Fig. 4, Plate 10) as forming frothy masses on the tips of pine twigs, and in the Nat'l Museum Coll. are some *Aphrophora* larvae labeled "Pa. On Pine, July 7," that undoubtedly belong to this species leaving little room to doubt the correctness of Fitch's determination.

There are two species belonging to the *parallela* group occurring in the Rocky Mountain region both found in the adult stage on pines. Of one of these (*A. permutata*, Fig. 1, 2 and 3, Plate 10) larvae were found in abundance on two different plants *Chrysopsis villosa* and *Lupinus sp.* Both of these plants grow in clumps and it was always down in the bases of these clumps, some of them often down below the surface of the ground among the roots, that the larvae were found. Often ten or fifteen would be found in a single clump their united froth masses, held up by the coarse stems, reaching a diameter of two inches or more.

The larvae were found in these clumps from late in May until the first week in July in the foot hills, and higher up in the mountains they were just beginning to emerge July 20th. When ready to emerge they climb up a stem during the night far enough to free themselves from the froth and as soon as the sun strikes then in the morning they burst their pupal skins and an hour later they are ready to fly up to the pine trees where their color admirably protects them.

Although both these plants grow very commonly over a wide extent of territory the *Aphrophora* larvae have never been found on them except where they were within a short distance of a pine tree. At first sight it would seem probable that the eggs were deposited in the twigs of the pines, and that the young larvae dropped to the ground, and from there sought out a food plant, as is the case in some Cicadas. But as numerous larvae were found in positions practically inaccessible to any such means of distribution—such as on the opposite side of a sharp ledge of rocks, across a bramble thicket, or

* For a detailed account of this process see Prof. Morse's article "A Bubble-blowing Insect." Pop. Sc. Monthly, May, 1900.

even on plants growing in the crevices of bare rocks at a considerable distance above any pines—it seemed nearly certain that the adults must fly back to the plants to deposit their eggs.

It will be interesting to discover whether a similar food habit occurs in any of the Eastern members of the genus or whether this is peculiar to the western species. It seems possible that original pine-inhabiting species finding themselves unable to maintain their froth masses in their exposed positions on pine branches in such a dry atmosphere were compelled to seek moister conditions such as are afforded by the shade and contact with the earth under these bushy plants.

EXPLANATION OF PLATE.—Fig. 1. *Aphrophora permutata* Uhl. Adult. X About 7. Common from the Rocky Mountains to the Pacific. 1a—Side view of head, showing profile of face.

Fig. 2. Pupa of above. 2a—Side view of head of pupa.

Fig. 3. Semi-diagramatic cross-section of a clump of *Chrysopsis villosa* to show relative location of larvae with relation to the froth mass and the surface of the earth.

Fig. 4. *Aphrophora parallela* Say Adult. X About 7. Eastern U. S. to Ohio and Mich. 4a—profile of head of same.